# 2. METHODOLOGY AND DECISION CRITERIA

This section describes the methodology used to perform the Project EASI/ED cost/benefit analysis and the evaluation criteria used in assessing qualitative benefits. Subsection 2.1 describes the steps comprising the cost/benefit analysis. Subsection 2.2 defines the classifications of costs and benefits used throughout the report. Subsection 2.3 presents the Project EASI/ED functional breakout. Subsection 2.4 presents the criteria used to evaluate Project EASI/ED functionality.

## 2.1 Methodology

The methodology for the cost/benefit analysis comprises 19 major steps. Although the steps are presented sequentially, actual implementation involves several concurrent activities. The 19 steps are:

1. **Establish a common set of functions as a foundation from which a comparison can be made between the current Title IV systems and Project EASI/ED.** Aggregate the Project EASI/ED functional requirements, as documented in the *Project EASI/ED BARD*, into 22 discrete functions that represent the capabilities Project EASI/ED is expected to provide. These 22 key functions cover all of the key functional capabilities that the current Title IV systems provide as well as those specific to Project EASI/ED. This step occurs concurrently with Step 2.

2. **Establish a set of qualitative evaluation criteria and criteria measurements that can be used to evaluate current functionality against Project EASI/ED functionality.** Identify, in consultation with ED, a set of qualitative criteria for use in evaluating each of the 22 functions. This step occurs concurrently with Step 1.

3. **Determine the relative weight of each evaluation criterion.** Use the Analytic Hierarchy Process (AHP) to establish the relative importance of every criterion to every other. This process produces a weight for each criteria, expressed as a percentage, that is used as part of the formal evaluation process. Section 2.4.2 describes this process in detail. This step occurs concurrently with Steps 4 and 5.

4. **Gather current Title IV system costs.** Collect cost data for each of the current Title IV systems, excluding the Institutional Data System (IDS). IDS costs are not collected because ED staff state that IDS is being replaced by the Postsecondary Education Participants System (PEPS) and that the costs reflected in PEPS accurately reflect the cost of functionality supported by PEPS and IDS. Gather cost information from ED staff who are responsible for current system internal costing and contractor costing. This step occurs concurrently with Steps 3 and 5.

5. **Map Project EASI/ED functions to current Title IV systems.** Using detailed functional mapping information from the *Project EASI/ED BARD* (July 1997), map each of the current Title IV systems to the functions that they provide and estimate the percentage of each system devoted to each function. This step occurs concurrently with Steps 3 and 4.

6. **Develop current Title IV cost models, FY1996 costs, and out-year cost estimates.** Develop Title IV system costing models, in Microsoft (MS) Excel, using the FIPS PUB 64 as a guideline. Map the FY1996 costing data provided by ED into the non-recurring and recurring categories for each Title IV system. The costing models are presented in Appendix H to this report. The models capture non-recurring and recurring costs by cost category and

by year. In addition, the cost models provide total life cycle cost, Net Present Value (NPV) cost by year and by life cycle total (NPV calculations are based on OMB guidelines), ED personnel growth factor, system growth factor per year, and cost allocations to each of the functions.

7. **Allocate current Title IV cost estimates across each of the 22 functions.** Using the figures determined in Step 5 (the percentage of each current system devoted to each function), calculate the cost of each function for each Title IV system. This is done by multiplying the cost of each current system by the percentage of that system devoted to each function. This spreads the total cost of the system appropriately across the functions that it provides.

8. **Determine each function s total cost within the current Title IV systems.** Build subject area models in MS Excel to contain costs for each of the functions within each subject area and use these to build subject area totals. These models are presented in Appendices B, C, D, E, F, and G to this report. Map the function costs for each Title IV system (calculated in Step 7) to these subject area cost models. Cost totals for each function are now established for the base year (FY1996) and projected for the out-years. These models present the same cost categories as the cost models described in Step 6 by providing non-recurring and recurring costs, total life cycle costs, and NPV cost by year and by total life cycle. However, these models sum costs by function across all Title IV systems, instead of by Title IV system across all functions.

9. **Calculate Project EASI/ED costs.** Take Project EASI/ED non-recurring hardware and software acquisition costs from the *Project EASI/ED TVTA Report.* Estimate non-recurring software development costs using Price Waterhouse guidelines (detailed in subsection 3.1.3, item 3). Derive Project EASI/ED recurring costs by applying a percentage of the total Project EASI/ED recurring costs to each recurring cost category. To determine the percentage figure for each cost category, use as a guideline the proportion of total recurring costs contributed by each recurring cost category in the current systems. The calculation of Project EASI/ED recurring costs is described in detail in Appendix I to this report.

10. **Allocate functions to Project EASI/ED.** Using detailed functional information from the *Project EASI/ED BARD*, determine what percentage each function contributes to Project EASI/ED as a whole. Section 3.1.3, Table 3.1.3-2 identifies the subject areas, the functions within each subject area, and the percentage that each function contributes to Project EASI/ED.

11. **Develop Project EASI/ED cost models and estimates.** Develop Project EASI/ED cost models, in MS Excel, using FIPS PUB 64 as a guideline. These models appear in Appendix I to this report. The models capture non-recurring and recurring costs by cost category (calculated in Step 9) and by year. In addition, the cost models provide total life cycle cost, NPV cost by year and by total life cycle (NPV calculations are based on OMB guidelines), ED personnel growth factor, system growth factor per year, and cost allocations to each of the functions.

    Spread non-recurring cost data (hardware and software acquisition, and development costs) for Project EASI/ED across 1998, 1999, and the year 2000. Estimate out-year non-recurring equipment and software and inflate them by a system growth factor. Inflate out-year recurring costs (starting in year 2001) by the same system growth factor.

12. **Spread Project EASI/ED cost estimates across each of the functions.** Using the percentage of total Project EASI/ED costs allocated to functions in Step 10, calculate the cost

for each function for Project EASI/ED. This is done by multiplying the Project EASI/ED system cost by the percentage of the system devoted to each function. This spreads the total cost of the Project EASI/ED system appropriately across the functions that it provides.

13. **Compare the current Title IV systems cost against Project EASI/ED costs by function.** Review summarized costs for each function and compare function costs between the total current Title IV systems and Project EASI/ED. Compare the cost figures for both total life cycle costs and for NPV life cycle costs. See Section 4 for discussion and presentation of the function costs.

14. **Identify qualitative and quantifiable benefits for each of the functions.** Review each function to identify any qualitative and/or quantifiable benefits. Identify qualitative benefits first. Identify components of the functionality within Project EASI/ED that are improved compared to the current functionality in the Title IV systems, using the evaluation criteria as a basis for comparison. Review and document benefits such as improved processing, reductions in data volumes, enhanced error/fraud control mechanisms, and improved customer service. Once qualitative benefits are identified, attempt to quantify the benefits where possible.

15. **Incorporate quantifiable benefits with cost estimates.** Expand the costing model to include incorporation of the quantifiable benefits for each function within Project EASI/ED, as well as providing the net resulting cost savings attributable to the Project EASI/ED functions.

16. **Compare the current Title IV systems cost against Project EASI/ED costs plus quantifiable benefits by function.** Review summarized costing information for each function and compare function costs between the total of the current Title IV systems and Project EASI/ED. Perform these comparisons for both total life cycle costs and for NPV life cycle costs. Section 5 the results of this comparison.

17. **Evaluate each function against each of the criteria based on cost, qualitative, and quantitative factors.** Develop a matrix to compare the relative strength of each of the 22 functions against each of the evaluation criteria. Establish a relative strength scale and score each function based on a comparison between current system functionality and Project EASI/ED functionality for each evaluation criterion. Once the scoring is complete for all functions, multiply each score for each evaluation criterion by the evaluation criterion's percentage weight. This results in a weighted score. Sum the weighted scores for each function, giving a final weighted score for each function. Section 5 presents the results of this evaluation.

18. **Perform sensitivity analysis.** Perform sensitivity analyses using the evaluation criteria weightings as variables. The results of the sensitivity analysis are shown in detail in Section 6.

19. **Formulate recommendations.** Recommend those areas of Project EASI/ED functionality that provide the greatest benefit in comparison with the current Title IV systems. Section 7 presents the *Project EASI/ED C/BA Report* recommendations.

## 2.2 Cost/Benefit Definitions and Classifications

This subsection identifies and defines the types of costs and benefits analyzed. The cost and benefit classifications used in the *Project EASI/ED C/BA Report* are based on the cost categories defined in FIPS 64. They are divided into two major categories: recurring and non-recurring. Recurring are those that are of an iterative or cyclic nature, such as labor costs. Non-recurring are those that occur one time in the product life cycle.

### 2.2.1 Non-Recurring Costs

The definitions for non-recurring cost categories appear below:

**Capital.** These costs apply to each function within the current system and within the Project EASI/ED system. Capital costs are costs for acquiring, developing, and/or installing:

- **Automated data processing equipment (ADPE)** - Computer hardware, including the central processing unit (CPU), hard drives, off-line storage units, printers, and monitors.
- **Telecommunications** - Modems, servers, routers, network monitors, and other hardware used for network trafficking of data.
- **Other equipment** - Equipment that does not fall into either category above.
- **Software** - Application software, system software, including operating system, data base management system(s), communications software, presentation software, and utilities.

**Other capital.** These costs apply to each function within the current system and within Project EASI/ED that does not fall into the above capital categories. These costs include:

- **Studies** - Detailed requirements and design studies for the facility, system hardware, and applications and system software. Studies include sizing studies, transition plans, feasibility and cost/benefit analyses, concept of operations, and other related studies.
- **Procurement** - Labor required for proposal development, updated cost/benefit analyses, briefings, requests for delegation of procurement authority, and other acquisition documentation.
- **Conversion and parallel operations** - Costs for converting existing applications where necessary and for migrating them to a new platform.

### 2.2.2 Recurring Costs

The definitions for recurring cost categories appear below:

- **Equipment lease, rentals, and in-house maintenance** - Annual costs for service contracts to maintain major hardware components.
- **Software lease, rental, and in-house maintenance** - Costs for leasing the software, vendor service contracts, and maintaining software.

- **Data communications lease, rental, and in-house maintenance** - Costs for leasing the telecommunications infrastructure, vendor service contracts, and maintaining the data communications hardware and software (that is, upgrading and correcting errors).
- **Personnel salaries** - Costs for ED employees directly and indirectly involved in managing, administering, and running the current 16 systems and the expected salaries based on an expected number required to manage and administer the new Project EASI/ED system.
- **Support services** (intra-agency services) - Costs for operating the current 16 systems and for operating the new Project EASI/ED system not included in the above categories.
- **Travel and training** - Costs incurred for training and travel of ED and contractor staff.
- **Space occupancy** - Annual costs required to house contractor personnel, offices, storage, data centers, and related administrative and management functions.

Other costs associated with this analysis include

- **Total system life cycle costs (LCC).** Sum of all costs from each of the outyears detailed in the analysis, without discounting. Discounting is the method for stating outyears or future years' costs in present year's dollars.
- **Present value (PV) costs.** PV is the value of money in today's dollars. PV is determined by using the Office of Management and Budget (OMB) published discount factor as set forth in OMB Circular A-94 (October 1992). The approved discount factor is 7 percent, where costs and benefits are stated in real dollars.
- **Total present value costs.** Sum of individual present values (PV's) for each of the outyears.

### 2.2.3 Non-Recurring Benefits

Benefits are classified as either quantitative or qualitative. A quantitative benefit is a benefit that can be measured, such as cost savings. Non-recurring benefits that are quantified are:

- **Cost Savings.** Cost savings are the result of comparing the costs of the current systems to those of Project EASI/ED. These savings come about as a result of reduced personnel, enhanced technology, re-engineered business processes, and so forth.

### 2.2.4 Recurring Benefits

Recurring benefits that are quantified are:

- **Cost avoidance.** Costs not incurred as a result of using an alternative approach.

- **Value enhancement.** Benefits that enhance the value of an application system, such as: improved resources utilization; improved administrative and operational effectiveness; and reduced error rates.

### 2.2.5 Qualitative Benefits

Qualitative benefits are those benefits that cannot easily be quantified in terms of direct dollar values. Examples of qualitative benefits are improved service, reduced risk, or improved access to imformation.

## 2.3 Functional Breakout

This section explains the functional breakout used to establish the framework for comparing discrete functions from Project EASI/ED and ED's current Title IV systems.

To perform a function-to-function cost/benefit analysis between the current Title IV systems (in total) and Project EASI/ED, it is necessary to first establish the single set of functions on which the comparison is based. Since Project EASI/ED provides all of the current functionality of ED's Title IV systems plus additional functionality, the functional requirements developed in the requirements definition phase of Project EASI/ED and presented in *The Project EASI/ED BARD* are used as the foundation for defining the 22 key functions used in this cost/benefit analysis. In addition, for purposes of this cost/benefit analysis an additional subject area, Information Sharing, was added. Although the *Project EASI/ED BARD* did not specifically allocate requirements to the Information Sharing subject area, its existence was implied throughout many of the functional requirements in the *BARD*. The 22 functions and the 6 subject areas used for this analysis are presented in Table 2.3-1. The table includes a numeric identifier (Funct. No.), subject area and function title (Project EASI/ED Subject Areas and Functions), and a function definition (Function Definition).

| Funct. No. | Project EASI/ED Subject Areas and Functions | Function Definition |
|---|---|---|
| | INFORMATION SHARING | |
| 1 | Interactive Student and Aid Organization Accounts | • Maintains information about the participant, such as application status, disbursements received, repayment status, and other aid-related information on a near real time basis.<br>• Provides student eligibility information to interested schools, and provides school and fund source information to interested students. |
| | APPLICATION | |
| 2 | Interactive Application Processing and Renewal | • Provides 24-hour, 7-days-a-week access for participant financial aid applications.<br>• Provides on-line authorization for application and waiver release data.<br>• Provides application data verification and error checking.<br>• Determines aid eligibility through access to external databases.<br>• Distributes aid eligibility determination to authorized parties.<br>• Pre-populates applications with data from external databases and from previous financial aid applications.<br>• Maintains all application data in an aid participant account.<br>• Distributes aid packaging to and from schools and aid organizations. |
| 3 | Pre-Enrollment Financial Aid Simulation Modeling | Models various simulations of financial aid, including:<br>• cost of attendance at a specific school for a particular program.<br>• if borrowing, the amount of projected payments.<br>• estimated salaries, given a specified career path.<br>• loan amortization schedules and capitalization of interest.<br>• projected tuition increases. |
| 4 | Multi-Year Promissory Note Processing | • Generates and distributes multi-year promissory notes covering various types of student financial aid. |
| | DISBURSEMENT | |
| 5 | Common Aid Origination | • Generates common aid origination record for all forms of student financial aid.<br>• Edits and checks origination records for student eligibility based on default, threshold, and other eligibility standards. |
| 6 | Interactive Participant Disbursement Authorization | • Prompts students for authorization to disburse aid.<br>• Transmits aid disbursement authorization from student to Project EASI/ED. |
| 7 | Draw Down School Disbursement Authorization | • Authorizes lump sum draw down school disbursements for Campus Based, Pell, and Direct Loan programs. |
| 8 | Invoice and Schedule Disbursement Authorization | • Activates invoice and schedule school disbursements based on valid incoming common origination and/or disbursement records. |

| Funct. No. | Project EASI/ED Subject Areas and Functions | Function Definition |
|---|---|---|
| | | • Authorizes, for the invoice method, disbursements based on valid disbursement records (invoices) submitted by schools.<br>• Authorizes, for the schedule method, disbursements based on the scheduled disbursement date in the aid origination record. |
| 9 | Disseminate School Disbursement Information | • Distributes student-level disbursement information to schools. |
| 10 | Perform Draw Down Reconciliation | • Reconciles draw down amounts disbursed to schools against disbursement, adjustment, and cancellation record received. |
| 11 | Fund Source Disbursement | • Confirms administrative expense allowances (AEA), reinsurance and special interest fees. |
| 12 | State Authorization Management | • Maintains and authorizes State Student Incentive Grant (SSIG) allotments and disbursements. |
| 13 | Consolidation Processing | • Processes consolidation of federal student loans with varying repayment terms into a single Direct consolidated loan, upon request from the participant or by the loan holder on behalf of the participant.<br>• Supports the consolidation of Federal Family Educational Loan Program (FFELP) loans by providing information about the consolidation process to the participant. |
| 14 | Enrollment Tracking and Reporting | • Tracks enrollment of all students.<br>• Initiates the beginning of loan grace period.<br>• Distributes updated enrollment status to loan holders and guaranty agencies. |
| | REPAYMENT | |
| 15 | Repayment Option Modeling and Selection/Repayment Counseling | • Repayment modeling - notifies borrowers of options available to repay loan(s) and processes borrowers' option requests.<br>• Repayment counseling - provides counseling to a student about debt and accumulated indebtedness |
| 16 | Customer Service Management | • Processes correspondence received from borrower.<br>• Manages information to be provided to schools, students, and general public.<br>• Processes phone calls received from students concerning their aid.<br>• Processes billing change dates, requests for new statements/bills/coupon books, requests for combined billing and facilitates automated clearinghouse (ACH) repayment for borrowers.<br>• Performs conflict resolution for loan origination and loan services when the loan is mishandled. |
| 17 | Repayment Maintenance | • Processes deferments, forbearances, discharges, cancellations and loan transfers, and converts loans to repayment status.<br>• Processes yearly updates and other adjustments to repayments. |

| Funct. No. | Project EASI/ED Subject Areas and Functions | Function Definition |
|---|---|---|
| | | • Receives and updates loan repayment information. |
| 18 | Defaulted Debt Collection | • Processes new defaulted debts.<br>• Tracks defaulted debts.<br>• Attempts to collect on defaulted debts through wage garnishment and federal offsets. |
| | PROGRAM MANAGEMENT AND OVERSIGHT | |
| 19 | School Eligibility and Data Maintenance | • Reviews schools' eligibility for certification in the student financial aid program.<br>• Reviews and issues sanctions against schools with high default rates and other poor performance.<br>• Supports decision support activities such as program review by ED program managers. |
| 20 | Guarantor and Lender Information Maintenance | • Establishes lender and guaranty agencies eligibility to participate in ED's financial aid programs.<br>• Reviews lender and guaranty agencies financial and fiscal operating conditions and their ownership structure.<br>• Reviews lender and guaranty agencies compliance with Federal and state regulations. |
| 21 | Program Data and Performance Information Management | • Responds to participant's request for information pertaining to participating schools and lenders in financial aid programs.<br>• Maintains data about aid programs. |
| | ACCOUNTING | |
| 22 | Integrated Accounting Management | • Uses standardized general accounting principles and approaches for ED. |

**Table 2.3 - 1, Function Definitions**

## 2.4 Decision Criteria and Weights

This section presents the evaluation criteria used for the Project EASI/ED cost/benefit analysis . This section also describes the methodology used to establish the relative importance of each criterion in relation to the other evaluation criteria.

### 2.4.1 Evaluation Criteria

The evaluation criteria for this cost/benefit analysis are based on major objectives of Project EASI:

- Provide a comprehensive information resource (**Information Resource**).
- Provide an enhanced customer service mechanism (**Customer Service**).
- Streamline and simplify student financial aid delivery processes (**Student Financial Aid Delivery Processes**).
- Improve program management and integrity (**Program Management and Integrity**).
- Reduce costs to manage and deliver financial aid (**NPV Cost Savings**).

The evaluation criteria and criteria measures were developed in coordination with responsible ED staff. Tables 2.4.1-1 to 2.4.1-5 provide definitions for each of the criteria, criteria measures, and measurable factors by which the functions can be evaluated and compared.

The definitions used are as follows:

- **Criterion Description:** A description of the scope of the criterion.
- **Criterion Measures:** The characteristics of the criterion.
- **Criteria Measurable Factors:** The factors that make up the criterion measures, and against which each Project EASI/ED function is measured.

| Criterion: | INFORMATION RESOURCE | |
|---|---|---|
| **Criterion Description:** | The degree to which all relevant information from all applicable sources is available, accessible, and secure, from a single point of interface, in support of postsecondary education organizations and customers throughout all phases of the postsecondary education life cycle. | |
| **Criterion Measures:**<br>• Single point of interface with postsecondary education community. | **Measurable Factors:**<br>Availability | The degree to which comprehensive, timely, and accurate information is available from a single source to all users (i.e., students, prospective students, families, schools, guaranty agencies, lenders, etc.) to support all phases of the postsecondary education life cycle. |
| • Accessible to all users (i.e., students, prospective students, families, schools, lenders). | Accessibility | The degree to which comprehensive, timely, and accurate information is accessible from a single source to all users (i.e., students, prospective students, families, schools, guaranty agencies, lenders, etc.) to support all phases of the postsecondary education life cycle. |
| • Secured access/delivery of data to only authorized parties. | Security | The degree to which the function provides adequate user authentication and information confidentiality related to the access and delivery of data within the postsecondary education community. |

**Table 2.4.1 - 1, Evaluation Criterion: Information Resource**

| Criterion: | CUSTOMER SERVICE | |
|---|---|---|
| **Criterion Description:** | The degree to which user's needs for services are met throughout all phases of the postsecondary education life cycle. | |
| **Criterion Measures:**<br>• "Near real time" turnaround on student aid transactions.<br>• Direct student involvement in service selection and delivery.<br>• Student-focuesd system for data collection, financial aid delivery, support service delivery, and data access. | **Measurable Factors:**<br>Responsiveness | The degree to which the function provides for responsiveness to user's service requests. |
| | Flexibility | The degree to which the function is capable of responding and handling varying and non-standard user service requests. |
| | Controllability | The degree to which the function allows user involvement in service selection and delivery. |

**Table 2.4.1 - 2, Evaluation Criterion: Customer Service**

| Criterion: | STUDENT FINANCIAL AID DELIVERY PROCESSES | |
|---|---|---|
| **Criterion Description:** | The degree to which student financial aid delivery processes and associated data are standardized and integrated throughout all phases of the postsecondary education life cycle. | |
| **Criterion Measures:**<br>• Maximizes use of a single set of integrated processes for all programs across the life cycle.<br>• Affords flexibility to accommodate other programs through use of industry-standard processes/best practices.<br>• Standardizes data exchanged among participants. | **Measurable Factors:**<br>Standardization | The degree to which student financial aid delivery processes and associated data are standardized within the function and between the function and other external entities. |
| | Integration | The degree to which the function supports student financial aid delivery processes that are integrated among participants. |

**Table 2.4.1 - 3, Evaluation Criterion: Student Financial Aid Delivery Processes**

| Criterion: | PROGRAM MANAGEMENT AND INTEGRITY | |
|---|---|---|
| **Criterion Description:** | The degree to which program management of postsecondary education information is supported and the integrity of that information throughout all phases of the postsecondary education life cycle. | |
| **Criterion Measures:**<br>• Ensures delivery of the correct amount of aid to the correct recipient at the correct time.<br>• Minimizes the need for after-the-fact reconciliation of data. | **Measurable Factors:**<br>Manageability | The degree to which the function supports the managing of postsecondary education operations and student financial aid delivery. |
| | Summarization | The degree to which information is summarized within and across functional areas within a system. |
| | Drill Down | The degree to which information is available at summary levels with supporting detail as well as providing key indicators to allow responsible staff to monitor and track student financial aid delivery. |
| | Error Control | The degree to which the system is susceptible to information errors. |
| | Reconciliation | The degree to which the function must reconcile its information with other sources. |
| | Data Validation | The degree to which the function must validate data before incorporating it into its database. |

**Table 2.4.1 - 4, Evaluation Criterion: Program Management and Integrity**

| Criterion: | NPV COST SAVINGS | |
|---|---|---|
| **Criterion Description:** | The measure of NPV cost savings associated with functional operation, maintenance, and enhancement activities. | |
| **Criterion Measures:**<br><br>• Reduce costs to manage and deliver financial aid. | **Measurable Factors:**<br>Operations | The measure of expected cost savings associated with operating hardware, software, and other components associated with the function. |
| | Maintenance | The measure of expected cost saving associated with maintaining hardware, software, and other components associated with the function. |
| | Enhancements | The measure of expected cost savings associated with enhancements to hardware, software, and other components associated with the function. |

**Table 2.4.1 - 5, Evaluation Criterion: NPV Cost Savings**

## 2.4.2 Evaluation Criteria Weighting Methodology

The Analytic Hierarchy Process (AHP) is used to determine relative weights for each of the evaluation criteria defined in subsection 3.3.1. AHP is a quantitative decision making methodology that uses pairwise comparisons to:

- Determine relative evaluation criteria importance.
- Determine relative strengths of decision alternatives.

AHP is used to determine the relative importance of the evaluation criteria but it is not used to determine the relative strengths of Project EASI/ED functions. The AHP methodology would call for determining the relative strength of each function in relation to every other function for each evaluation criteria. The underlying assumption with this pairwise comparison is that each of the functions is totally independent of every other function. This is not true in this analysis. Each of the function are in some way dependent and/ or linked to other functions. Because this dependency exists, it is not possible to compare each function to every other function within an evaluation criterion as AHP methodology dictates. Instead, the functions were compared to each evaluation criterion to determine their relative strength in that criteria area. This process and the results are detailed in Section 5.

The decision-maker determines the relative importance of evaluation criteria by comparing each criterion against every other criterion. For example, Information Resources is compared to each of the other criteria: Customer Service, Student Financial Aid Delivery, Program Management and Integrity, and NPV Cost Savings. Using a predefined scale, the decision-maker can determine how important Information Resource is relative to each of the other criteria. Using these determinations, the decision-maker can then calculate what percentage of the decision should be based on each criterion.

The following steps were used to determine the evaluation criteria's relative importance:

**Step 1.** Identify criteria for evaluating Project EASI/ED system functionality, as well as the evaluation scale to be used during pairwise comparisons.

**Step 2.** Determine the relative importance of cost/benefit analysis evaluation criteria using pairwise comparisons.

**Step 3.** Tailor relative importance (weights) of evaluation criteria based on ED's managerial and technical experience with the current Title IV systems and ED's priorities for Project EASI/ED.

**Step 4.** Rank the Project EASI/ED evaluation criteria based on relative importance percentage scores.

Subsections 2.4.2.1 to 2.4.2.5 provide a detailed description of how the above AHP steps are applied to arrive at the evaluation criteria relative importance percentages.

### 2.4.2.1 Preference Scale

After selecting the evaluation criteria, an evaluation scale is defined. Table 2.4.2-1 presents the preference scale.

| Weight | Preference |
|---|---|
| 1 | Equally Preferred / Equally Important |
| 2 | Moderately Preferred / Moderately More Important |
| 3 | Strongly Preferred / Much More Important |
| 4 | Very Strongly Preferred / Very Much More Important |
| 5 | Extremely Preferred / Extremely More Important |

**Table 2.4.2 - 1, Evaluation Criteria Preference Scale**

### 2.4.2.2 Determine Relative Importance of Criteria

To determine the relative importance of each evaluation criterion, a pairwise comparison of the evaluation criteria is performed. That is, each criterion is compared with every other criterion. Using the evaluation scale defined in 2.4.3.1, a level of importance, relative to other criteria, is calculated for each criterion. ED staff provided the weightings shown in Table 2.4.2-2.

| CRITERIA | (INFORES) | (CUSTSERV) | (SFADP) | (PMI) | (COSTSAV) |
|---|---|---|---|---|---|
| Information Resource (INFORES) | 1 | 4 | | 4 | 3 |
| Customer Service (CUSTSERV) | | 1 | | 1 | 3 |
| Student Financial Aid Delivery Processes (SFADP) | 3 | 4 | 1 | 1 | 3 |
| Program Management and Integrity (PMI) | | 1 | 1 | 1 | 3 |
| NPV Cost Savings (COSTSAV) | | | | | 1 |

**Table 2.4.2 - 2, Pairwise Criteria Weightings**

### 2.4.2.3 Complete Comparison Matrix

To complete the matrix two principles must be understood. The first of these principles is that all criteria are "Equally Important" (1) when compared to themselves. The second principle is based on the observation that if, for example, one criterion is twice as important as the second, then the second

criterion must be considered one-half as important as the first. The completed comparison matrix is shown in Table 2.4.2-3.

| CRITERIA | (INFORES) | (CUSTSERV) | (SFADP) | (PMI) | (COSTSAV) |
|---|---|---|---|---|---|
| Information Resource (INFORES) | 1 | 4 | 1/3 | 4 | 3 |
| Customer Service (CUSTSERV) | 1/4 | 1 | 1/4 | 1 | 3 |
| Student Financial Aid Delivery Processes (SFADP) | 3 | 4 | 1 | 1 | 3 |
| Program Management and Integrity (PMI) | 1/4 | 1 | 1 | 1 | 3 |
| NPV Cost Savings (COSTSAV) | 1/3 | 1/3 | 1/3 | 1/3 | 1 |

**Table 2.4.2 - 3, Pairwise Criteria Weightings**

The table is read by comparing the criteria in the column on the left to each of the criteria in the header row of the table. For example, from the table above *INFORES* is **Very Strongly Preferred / Very Much More Important** (4) than *CUSTSERV*.

### 2.4.2.4 Determine Criteria Weight

Once the matrix has been completed, assigned values are converted to decimals (so that they are easier to work with) and column totals are calculated. This is illustrated in Table 2.4.2-4.

| CRITERIA | (INFORES) | (CUSTSERV) | (SFADP) | (PMI) | (COSTSAV) |
|---|---|---|---|---|---|
| Information Resource (INFORES) | 1.0000 | 4.0000 | .3333 | 4.0000 | 3.0000 |
| Customer Service (CUSTSERV) | .2500 | 1.0000 | .2500 | 1.0000 | 3.0000 |
| Student Financial Aid Delivery Processes (SFADP) | 3.0000 | 4.0000 | 1.0000 | 1.0000 | 3.0000 |
| Program Management and Integrity (PMI) | .2500 | 1.0000 | 1.0000 | 1.0000 | 3.0000 |
| NPV Cost Savings (COSTSAV) | .3333 | .3333 | .3333 | .3333 | 1.0000 |
| Total: | 4.8333 | 10.3333 | 2.9166 | 7.3333 | 13 |

**Table 2.4.2 - 4, Criteria Weightings Converted and Totaled**

Once column totals have been determined, the numbers in the matrix are divided by their respective column totals. This results in the values shown in Table 2.4.2-5

| CRITERIA | (INFORES) | (CUSTSERV) | (SFADP) | (PMI) | (COSTSAV) |
|---|---|---|---|---|---|
| Information Resource (INFORES) | .2069 | .3871 | .1143 | .5455 | .2308 |
| Customer Service (CUSTSERV) | .0517 | .0968 | .0857 | .1364 | .2308 |
| Student Financial Aid Delivery Processes (SFADP) | .6207 | .3871 | .3429 | .1364 | .2308 |
| Program Management and Integrity (PMI) | .0517 | .0968 | .3429 | .1364 | .2308 |
| NPV Cost Savings (COSTSAV) | .0690 | .0323 | .1143 | .0455 | .0769 |

**Table 2.4.2 - 5, ED Provided Pairwise Criteria Weightings After Calculation**

### 2.4.2.5 Criteria Relative Importance

Finally, to determine the relative importance of each evaluation criterion being considered, row averages are calculated and converted to percentages. These percentages (Relative Importance) are documented in Table 2.4.2-6.

| CRITERIA | Relative Importance |
|---|---|
| Information Resource (INFORES) | 30% |
| Customer Service (CUSTSERV) | 12% |
| Student Financial Aid Delivery Processes (SFADP) | 34% |
| Program Management and Integrity (PMI) | 17% |
| NPV Cost Savings (COSTSAV) | 7% |

**Table 2.4.2 - 6, Criteria Relative Importance**